

Archived Information



Effects of Technology on Classrooms and Students

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Change in Student and Teacher Roles

When students are using technology as a tool or a support for communicating with others, they are in an active role rather than the passive role of recipient of information transmitted by a teacher, textbook, or broadcast. The student is actively making choices about how to generate, obtain, manipulate, or display information. Technology use allows many more students to be actively thinking about information, making choices, and executing skills than is typical in teacher-led lessons. Moreover, when technology is used as a tool to support students in performing authentic tasks, the students are in the position of defining their goals, making design decisions, and evaluating their progress.

The teacher's role changes as well. The teacher is no longer the center of attention as the dispenser of information, but rather plays the role of facilitator, setting project goals and providing guidelines and resources, moving from student to student or group to group, providing suggestions and support for student activity. As students work on their technology-supported products, the teacher rotates through the room, looking over shoulders, asking about the reasons for various design choices, and suggesting resources that might be used. ([See example of teacher as coach.](#))

Project-based work (such as the [City Building Project](#) and the [Student-Run Manufacturing Company](#)) and cooperative learning approaches prompt this change in roles, whether technology is used or not. However, tool uses of technology are highly compatible with this new teacher

role, since they stimulate so much active mental work on the part of students. Moreover, when the venue for work is technology, the teacher often finds him or herself joined by many peer coaches--students who are technology savvy and eager to share their knowledge with others.

Increased Motivation and Self Esteem

The most common--and in fact, nearly universal--teacher-reported effect on students was an increase in motivation. Teachers and students are sometimes surprised at the level of technology-based accomplishment displayed by students who have shown much less initiative or facility with more conventional academic tasks:

The kids that don't necessarily star can become the stars. [with technology]. My favorite is this boy . . . who had major problems at home. He figured out a way to make music by getting the computer to play certain letters by certain powers and it changed the musical tone of the note and he actually wrote a piece. He stayed in every recess. . . . When I asked him what he was working on, he wouldn't tell me. Then he asked if he could put his HyperCard stack on my computer because it was hooked up to speakers. I said "sure" and at recess. . . he put it on my computer and played his music and literally stopped the room. And for months he had kids begging him at recess, every recess, to teach them how to make music. And for that particular kid it was the world because he really was not successful academically and was having lots of problems. . . . This really changed him for that school year. --Elementary school teacher

Teachers talked about motivation from a number of different perspectives. Some mentioned motivation with respect to working in a specific subject area, for example, a greater willingness to write or to work on computational skills. Others spoke in terms of more general motivational effects--student satisfaction with the immediate feedback provided by the computer and the sense of accomplishment and power gained in working with technology:

Kids like the immediate results. It's not a result that you can get anywhere else except on the computer. . . . For them it really is a big deal. Much more so than I ever thought it was going to be. --Elementary school teacher

Technology is the ultimate carrot for students. It's something they want to master. Learning to use it enhances their self-esteem and makes them excited about coming to school. --Fifth grade teacher

The computer has been an empowering tool to the students. They have a voice and it's not in any way secondary to anybody else's voice. It's an equal voice. So that's incredibly positive. Motivation to use technology is very high. --Elementary school teacher

In many of these classes, students choose to work on their technology-based projects during recess or lunch periods. Teachers also frequently cite technology's motivational advantages in providing a venue in which a wider range of students can excel. Compared to conventional classrooms with their stress on verbal knowledge and multiple-choice test performance, technology provides a very different set of challenges and different ways in which students can

demonstrate what they understand (e.g., by programming a simulation to demonstrate a concept rather than trying to explain it verbally).

A related technology effect stressed by many teachers was enhancement of *student self esteem*. Both the increased competence they feel after mastering technology-based tasks and their awareness of the value placed upon technology within our culture, led to increases in students' (and often teachers') sense of self worth.

I see more confidence in the kids here. . . . I think it's not just computers, it's a multitude of things, but they can do things on the computers that most of their parents can't do and that's very empowering and exciting for them. It's "I can sit down and make this machine pretty much do what I want to," and there's something about that that gives them an extra little boost of, "Wow, I'm a pretty special person." --Elementary school teacher

Students clearly take pride in being able to use the same computer-based tools employed by professionals. As one teacher expressed it, "Students gain a sense of empowerment from learning to control the computer and to use it in ways they associate with the real world." Technology is valued within our culture. It is something that costs money and that bestows the power to add value. By giving students technology tools, we are implicitly giving weight to their school activities. Students are very sensitive to this message that they, and their work, are important.

Technical Skills

Students, even at the elementary school level, are able to acquire an impressive level of skill with a broad range of computer software (see [examples](#)). Although the specific software tools in use will likely change before these students enter the world of work, the students acquire a basic understanding of how various classes of computer tools behave and a confidence about being able to learn to use new tools that will support their learning of new software applications.

Accomplishment of More Complex Tasks

Teachers for the observed classes and activities at the case study sites were nearly unanimous also in reporting that students were able to handle *more complex assignments* and do more with higher-order skills (see [examples](#)) because of the supports and capabilities provided by technology.

More Collaboration with Peers

Another effect of technology cited by a great majority of teachers is an increased inclination on the part of students to *work cooperatively* and to provide *peer tutoring*. While many of the classrooms we observed assigned technology-based projects to small groups of students, as discussed above, there was also considerable tutoring going on around the use of technology itself. Collaboration is fostered for obvious reasons when students are assigned to work in pairs or small groups for work at a limited number of computers. But even when each student has a computer, teachers note an increased frequency of students helping each other. Technology-based tasks involve many subtasks (e.g., creating a button for a *HyperCard* stacks or making columns with word processing software), leading to situations where students need help and find their neighbor a convenient source of assistance. Students who have mastered specific computer skills generally derive pride and enjoyment from helping others.

In addition, the public display and greater legibility of student work creates an invitation to comment. Students often look over each others' shoulders, commenting on each others' work, offering assistance, and discussing what they are doing.

I've also seen kids helping each other a lot at the computer. The ones that pick it up faster, they love teaching it to someone that doesn't know it yet. --Fifth-grade teacher
The ones who have used it from the beginning have become peer coaches. --Fifth-grade teacher

Students' ability to collaborate on substantive content can be further enhanced through the use of software applications specifically designed for this purpose. Students in several classes at one of our case study sites used a research package called [CSILE](#) (Computer Supported Intentional Learning Environment), for building a communal database and exchanging comments about each others' ideas.

One of our teacher informants made the point that the technology invites peer coaching and that once established, this habit carries over into other classroom activities:

It's a much more facilitating atmosphere because the kids help each other so much on the computer. It changes the style and the tone of the classroom a lot. --Elementary school teacher

Though the use of technology often promoted collaboration and cooperation among students at these case study sites, there were still concerns about appropriate [student conduct](#). Many schools implement *acceptable use policies*, especially if they offer students access to the Internet. (See examples of [Sharenet's formal technology use agreement](#) or other acceptable use policies.)

Increased Use of Outside Resources

Teachers from 10 out of 17 classrooms observed at length cited increased use of outside resources as a benefit of using technology. This effect was most obvious in classrooms that had

incorporated telecommunications activities (see [examples](#)), but other classes used technologies such as satellite broadcasts, telefacsimiles, and the telephone to help bring in outside resources.

Improved Design Skills/Attention to Audience

Experiences in developing the kinds of rich, multimedia products that can be produced with technology, particularly when the design is done collaboratively so that students experience their peers' reactions to their presentations, appear to support a greater awareness of audience needs and perspectives. Multiple media give students choices about how best to convey a given idea (e.g., through text, video, animation). In part because they have the capability to produce more professional-looking products and the tools to manipulate the way information is presented, students in many technology-using classes are reportedly spending more time on design and audience presentation issues.

They also do more stylistic things in terms of how the paper looks, and if there is something they want to emphasize, they'll change the font . . . they're looking at the words they're writing in a different way. They're not just thinking about writing a sentence, they're doing that, but they are also thinking about, "This is a really important word" or "This is something I want to stand out." And they're thinking in another completely different way about their audience. --Elementary school teacher

While most teachers were positive about the design consciousness that technology fosters, a potential downside was also noted by a few teachers. It is possible for students to get so caught up in issues such as type font or audio clips that they pay *less* attention to the substantive content of their product. We observed one computer lab within which several students with a research paper assignment spent the entire period coloring and editing the computer graphics for the covers of their as-yet-unwritten reports, pixel by pixel. Teachers are developing strategies to make sure that students do not get distracted by some of the more enticing but less substantive features of technology, for example, by limiting the number of fonts and font sizes available to their students.

RATIONALE **HOME**

Resource: <http://www2.ed.gov/pubs/EdReformStudies/EdTech/effectsstudents.html>